

Radiation Budget Workshop , ECMWF Reading
2016, October 17-21th

ScaRab Instrument Monitoring and Data Status

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Radiation Budget Workshop

ScaRab Instrument Monitoring and Data Status

- ☐ **CNES Center of Expertise**
- ☐ **Overview of ScaRab level1 products**
- ☐ **Quality Monitoring and Completeness of data archive**
- ☐ **Data Access**

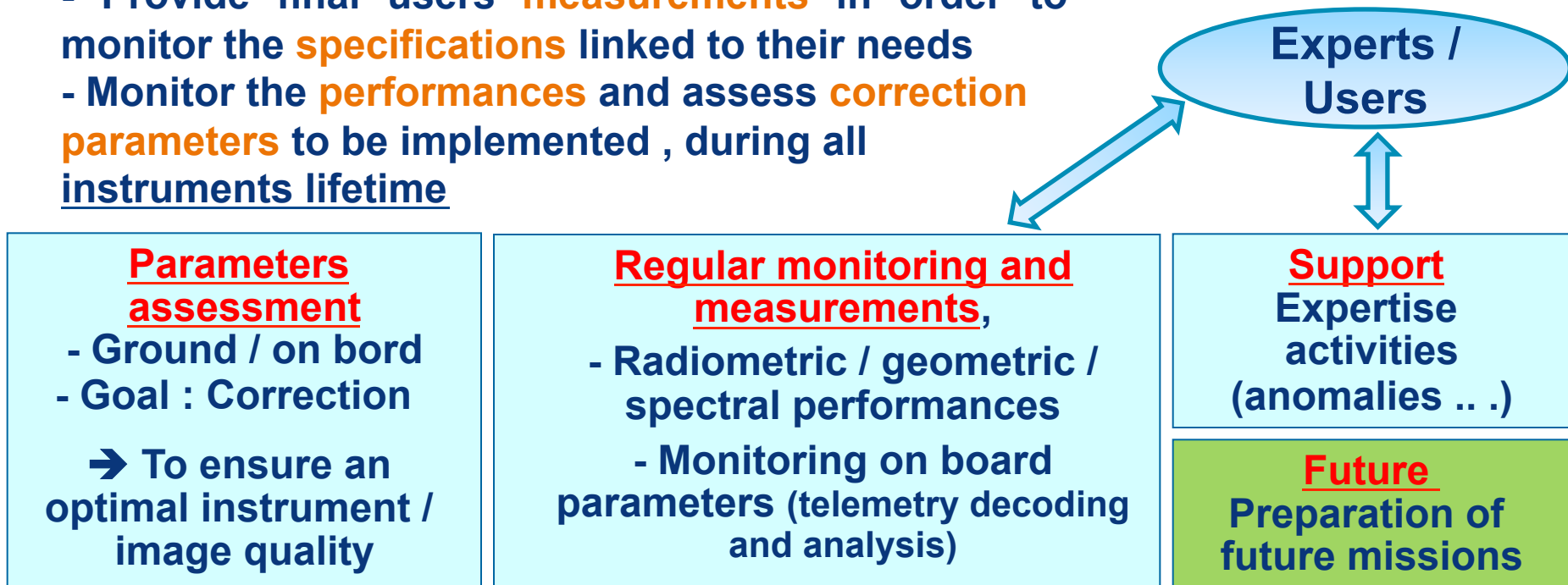
CNES Expertise Center

Overview of activities 1/4

Expertise Center

Monitoring and Expertise Center :

- Provide final users **measurements** in order to monitor the **specifications** linked to their needs
- Monitor the **performances** and assess **correction parameters** to be implemented , during all instruments lifetime



Maintenance in Operationnal Conditions

Systems operationnal everyday (=> to limitate loss of activity)

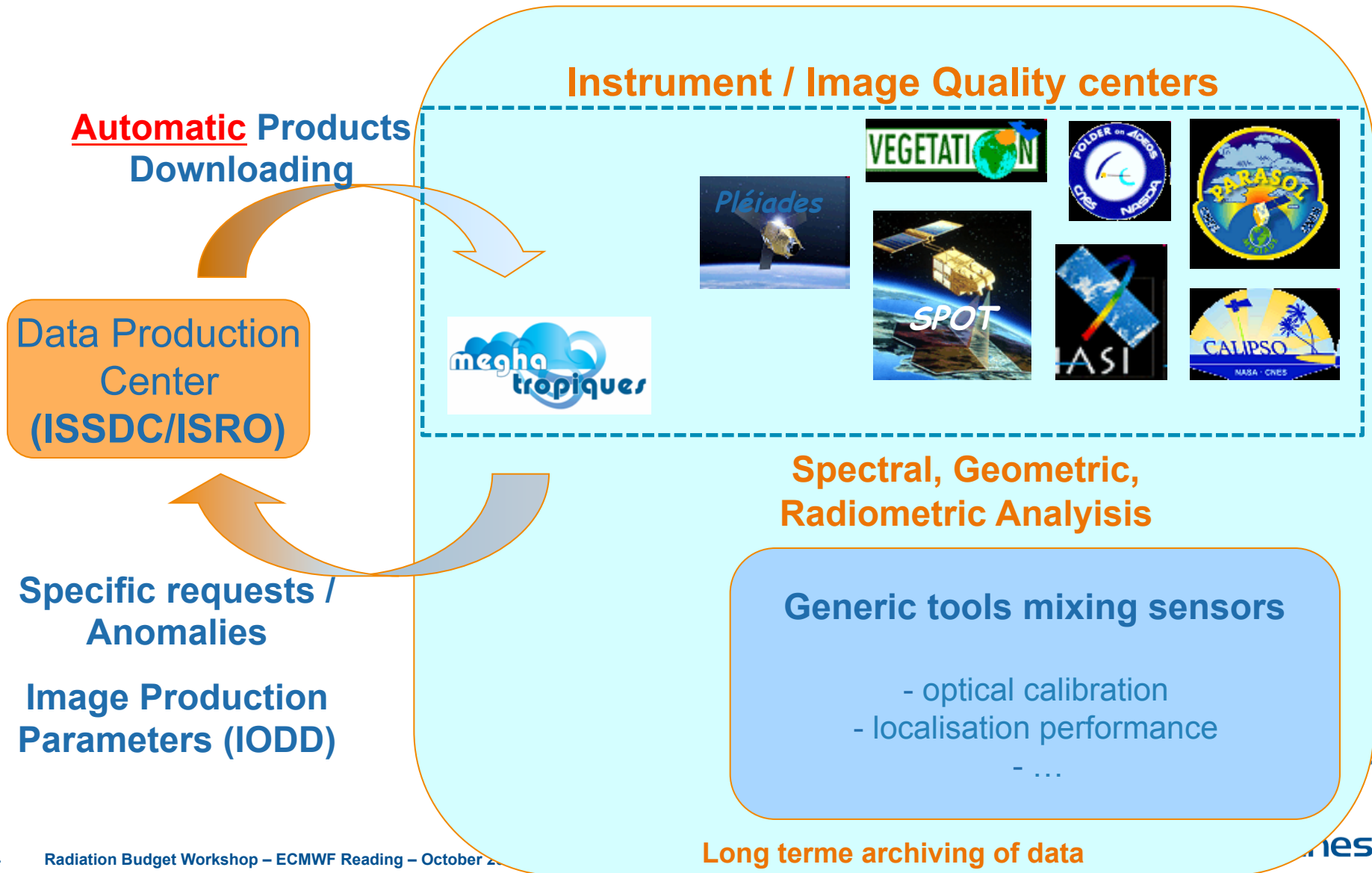


Quality Label (« certificate ») for data generated with these parameters

CNES Expertise Center

Overview of activities 2/4

Expertise Center



CNES Expertise Center

Overview of activities 3/4

Expertise Center

Database
access

Carto

Specific
actions

quicklook

Software based on
a generic structure

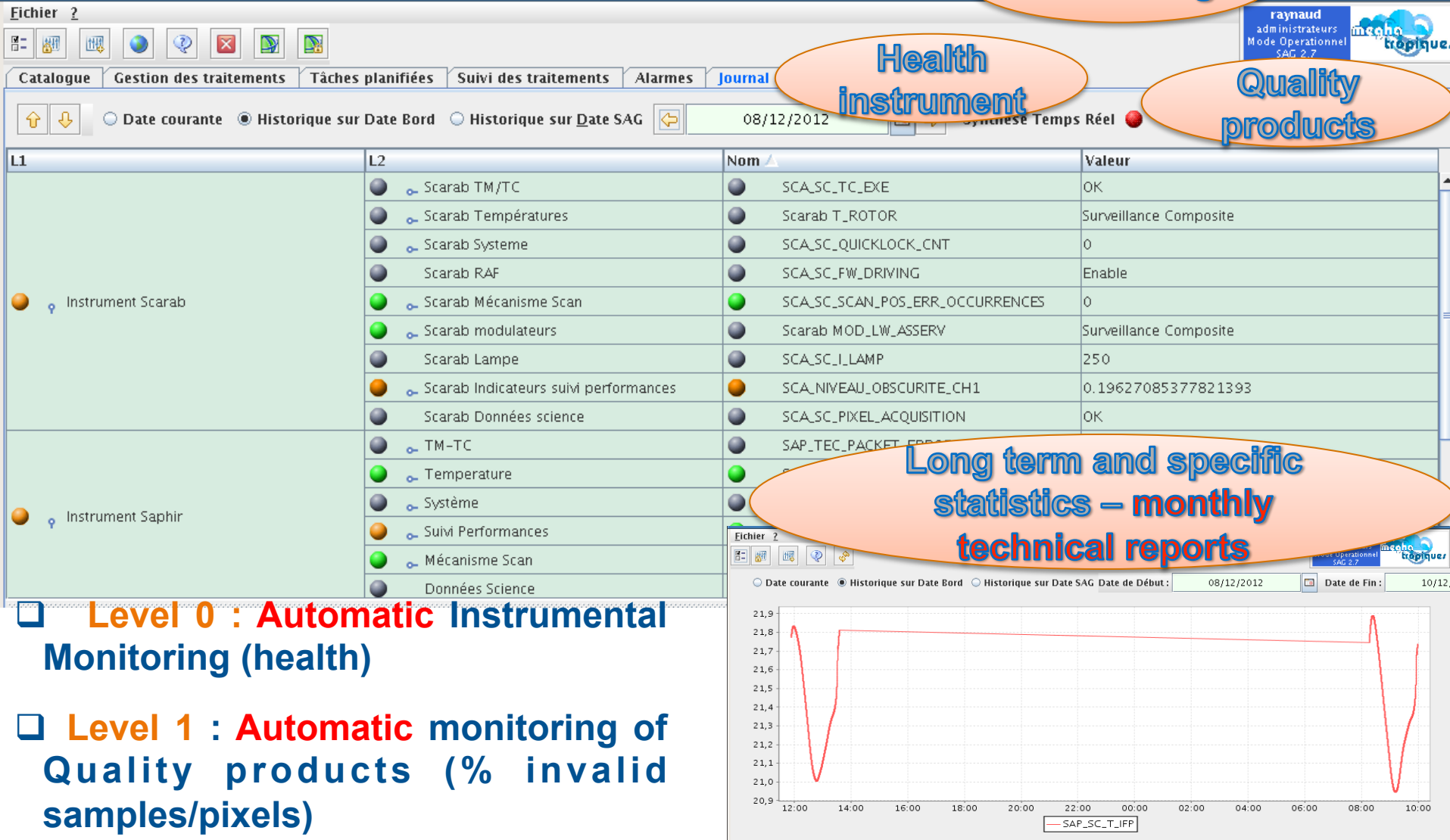
CNES Expertise Center Overview of activities 4/4

Expertise Center

Monitoring

Health
instrument

Quality
products



Long term and specific
statistics – monthly
technical reports

Level 0 : Automatic Instrumental Monitoring (health)

Level 1 : Automatic monitoring of Quality products (% invalid samples/pixels)

ScaRab : Products Definition 1/4

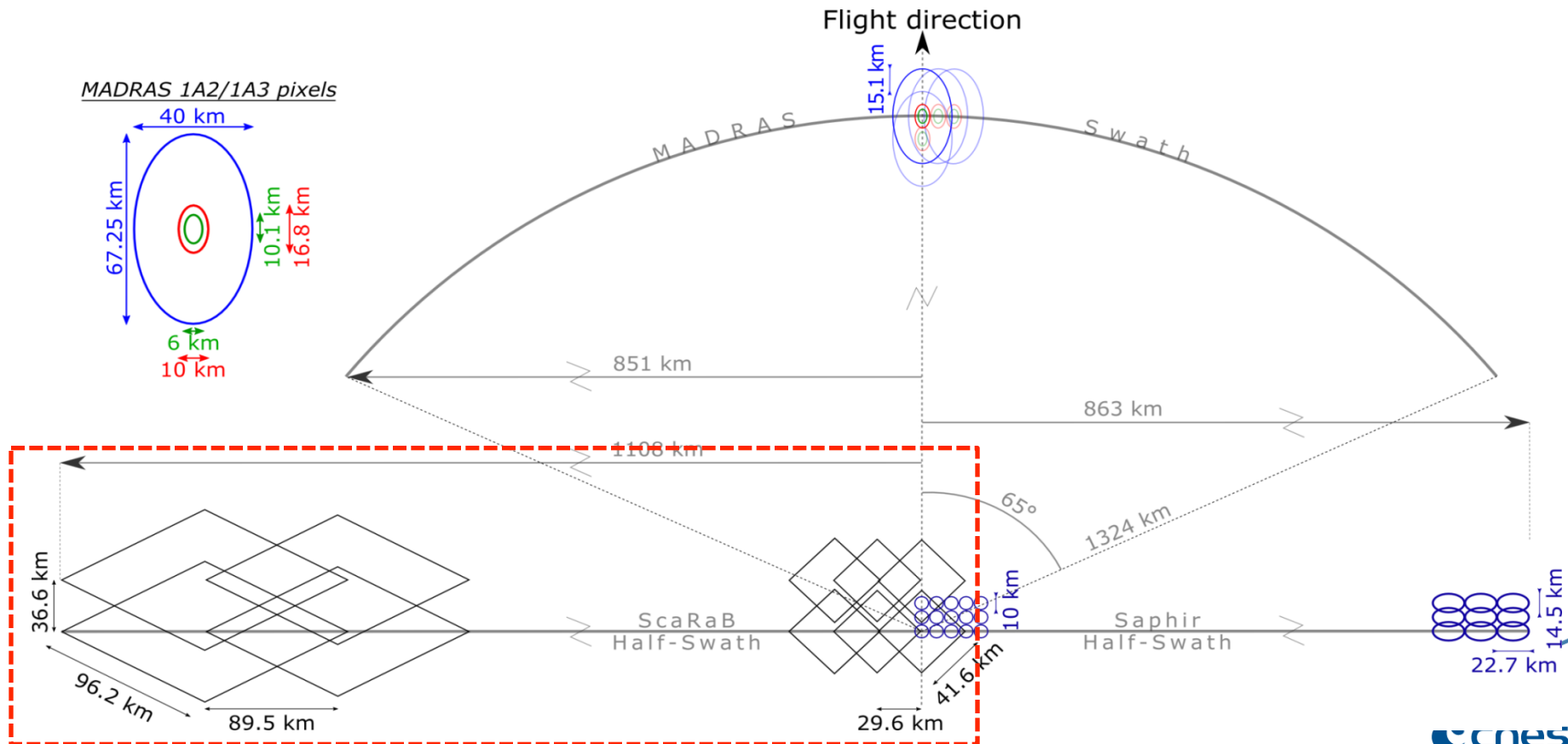
Scarab Products

❑ **SCARAB** : multi-spectral passive radiometer

❑ Also on board Megha-Tropiques satellite :

MADRAS : microwave passive conical radiometer (9 canal)

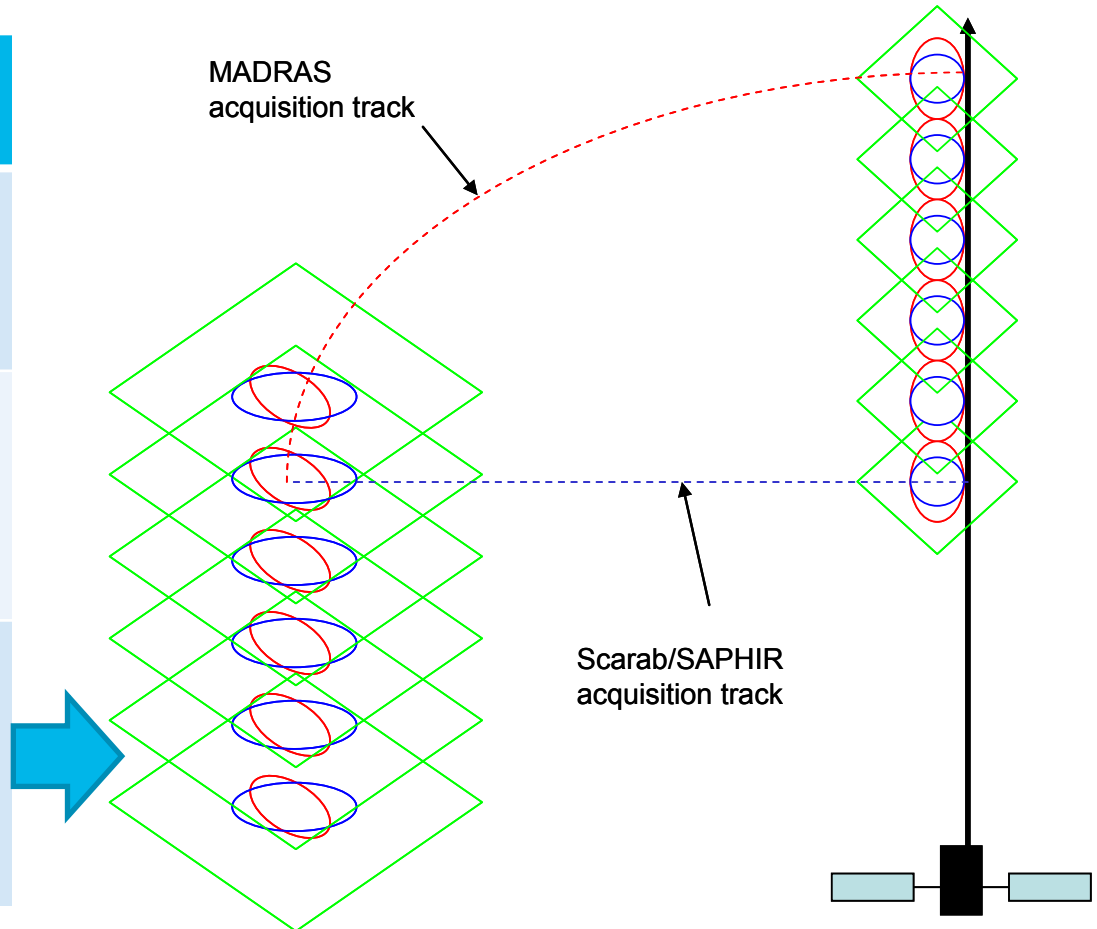
SAPHIR : microwave passive radiometer, (6 canal, Xtrack 10km),



ScaRab : Products Definition 2/4

Scarab Products

| Physical Level | SCARAB |
|----------------|--|
| Level 1A | Radiance sample (avec overlap) |
| Level 1A2 | Idem 1A with improvement of channel registration |
| Level 1A3 | Radiance projection in Madras 89Ghz grid |



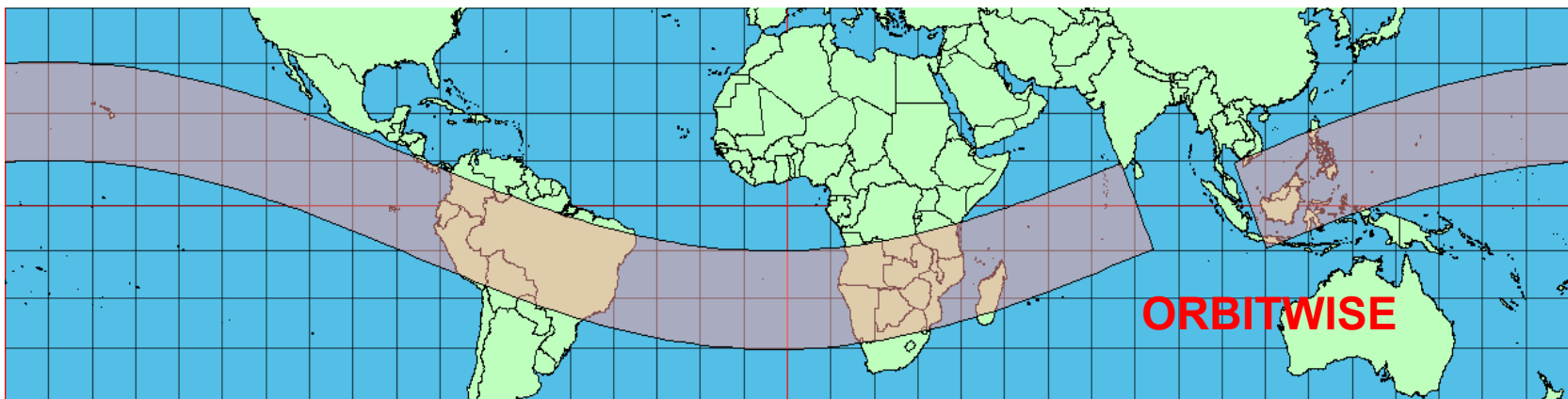
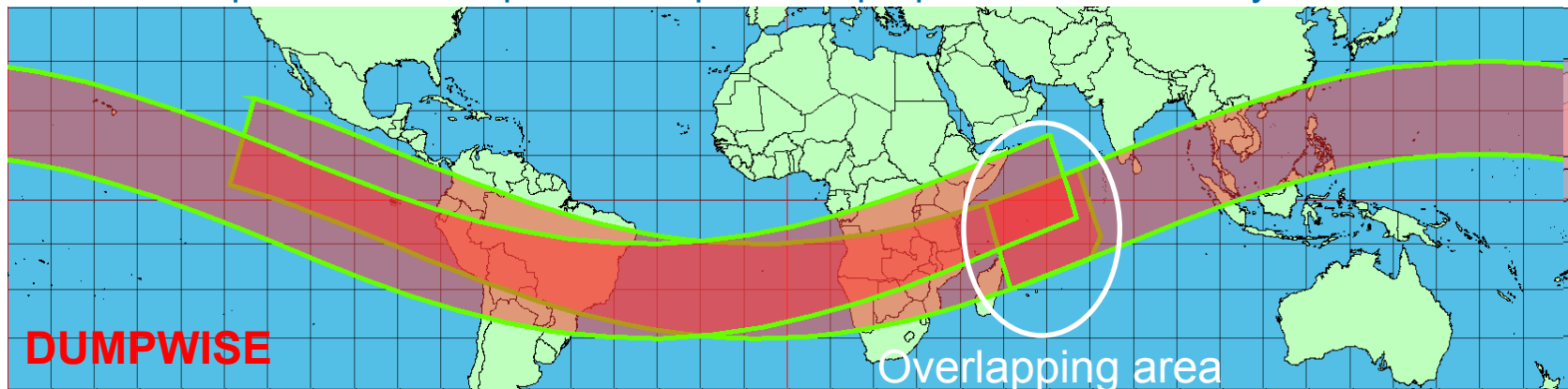
Pixel representation on ground of the 3 instruments

ScaRab : Products Definition 3/4

Scarab Products

□ Products types

- **DUMPWISE Products** : data dumped over station without modification (various sizes possible), with overlapping area between consecutive products
» → Duplication of scans (data)
- **ORBITWISE Products** : combination of N ($=1,2,3,\dots$) DUMPWISE products
→ product from equator to equator, superposition for same cycle orbit



ScaRab : Products Definition 4/4

Scarab Products

❑ Identification L1A2 products

Dumpwise product :

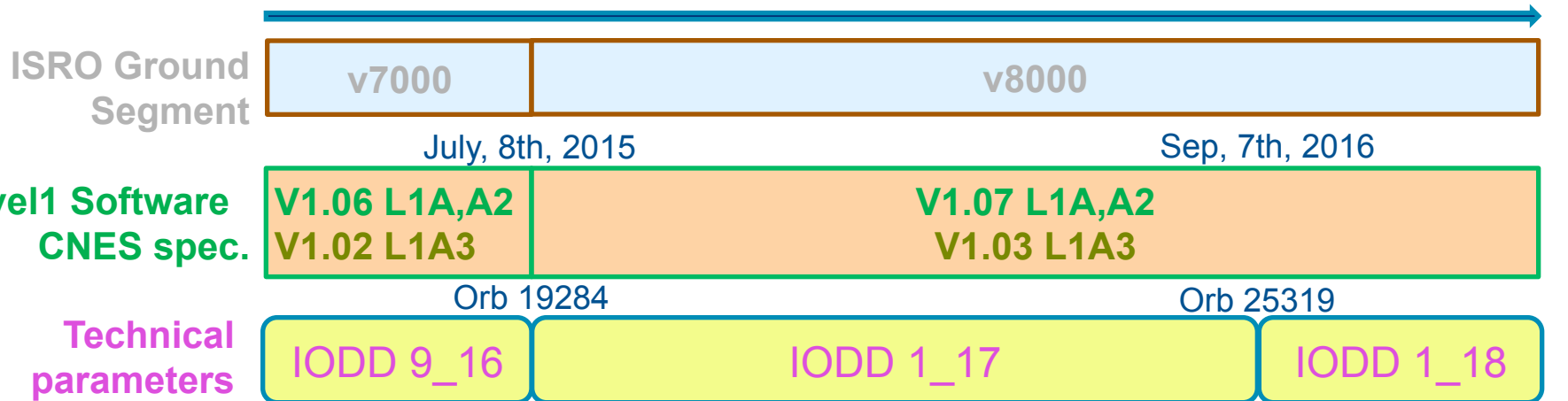
MT1SCASL1A2_1.07_000_1_18_I_beginat_enddate_beginorbit_endorbit_DOY_cycleorbitdeb_cycleorbitend_Station_NumSegment

Orbitwise product :

MT1SCAOL1A2_1.07_1_18_I_[begin_date]_DOY_cycleorbit_absoluteorbit

❑ Data Status

time



- Completeness
- Update A' and radio param.
- Big files processing
- Gains correction

- Technical document to explain Gains & A' updated topic

ScaRab : Monitoring Activities 1/5

Data Monitoring

❑ SCARAB : Monitoring [01/11/2014 – 01/09/2016]

● Products monitoring

◆ 288 Parameters monitored :

- ✓ 26 L1 quality parameters , 262 L0 health parameters (per scan and/or per orbit)

◆ SCARAB L0 products

- ✓ 8 463 Dumpwises products → 8440 L0 Orbitwises monitored
- ✓ More than **330 millions** monitoring values generated

◆ SCARAB L1 products

- ✓ 31 512 products monitored (L1A& A2 Dump&Orb)
- ✓ More than **756 000** monitoring values generated

◆ Anomalies raised

- ✓ Warnings & Errors on the period : **89 165** ↔ **0,027 %** of whole monitoring

➔ Instrument Status OK

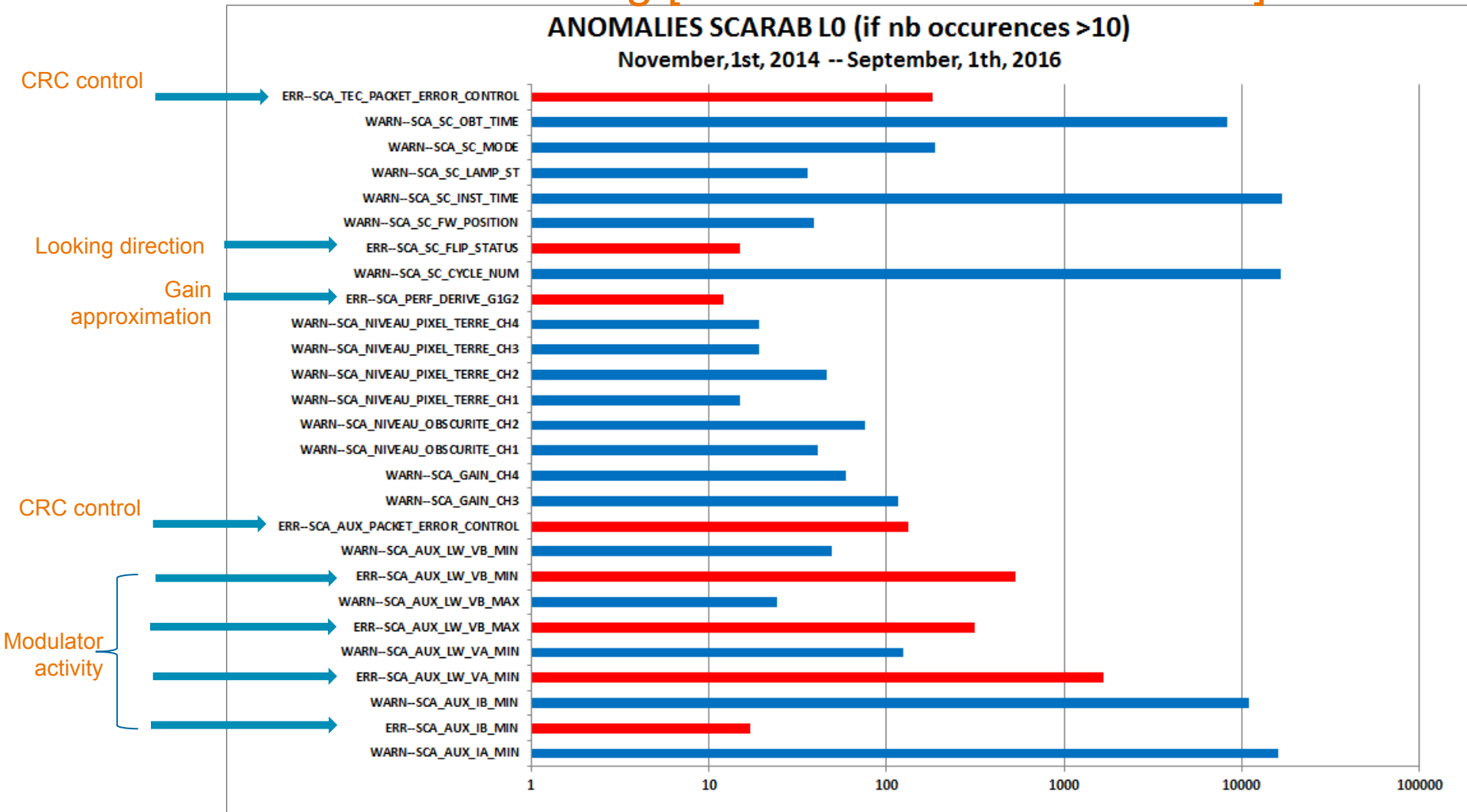
➔ L1 Data Quality OK (*actions & investigations*

ongoing to improve it)

ScaRab : Monitoring Activities 2/5

Data Monitoring

SCARAB : L0 Monitoring [01/11/2014 – 01/09/2016]

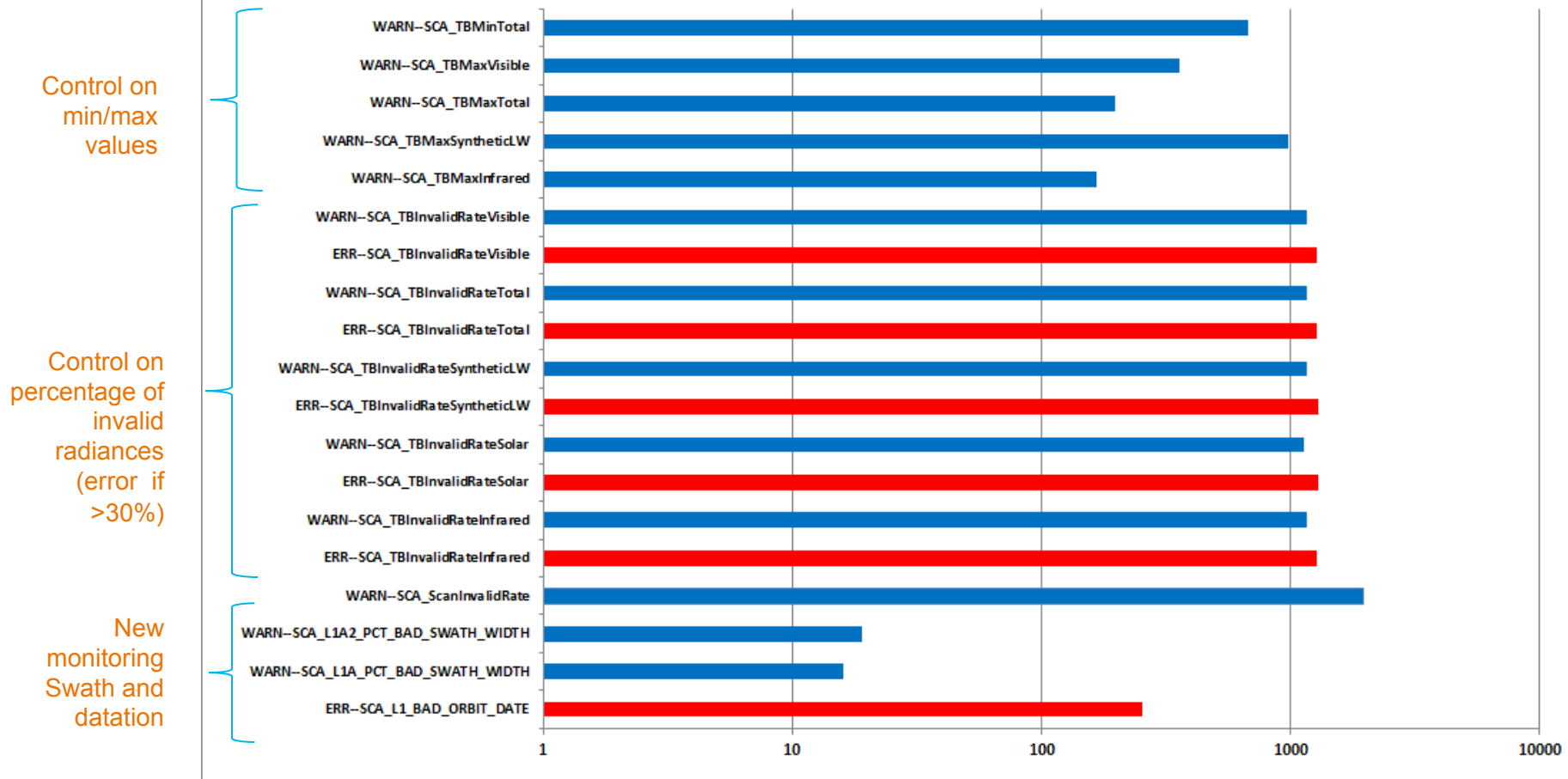


ScaRab : Monitoring Activities 3/5

Data Monitoring

SCARAB : L1 Monitoring [01/11/2014 – 01/09/2016]

ANOMALIES SCARAB L1 (if nb occurrences >10)
November,1st, 2014 -- September, 1th, 2016

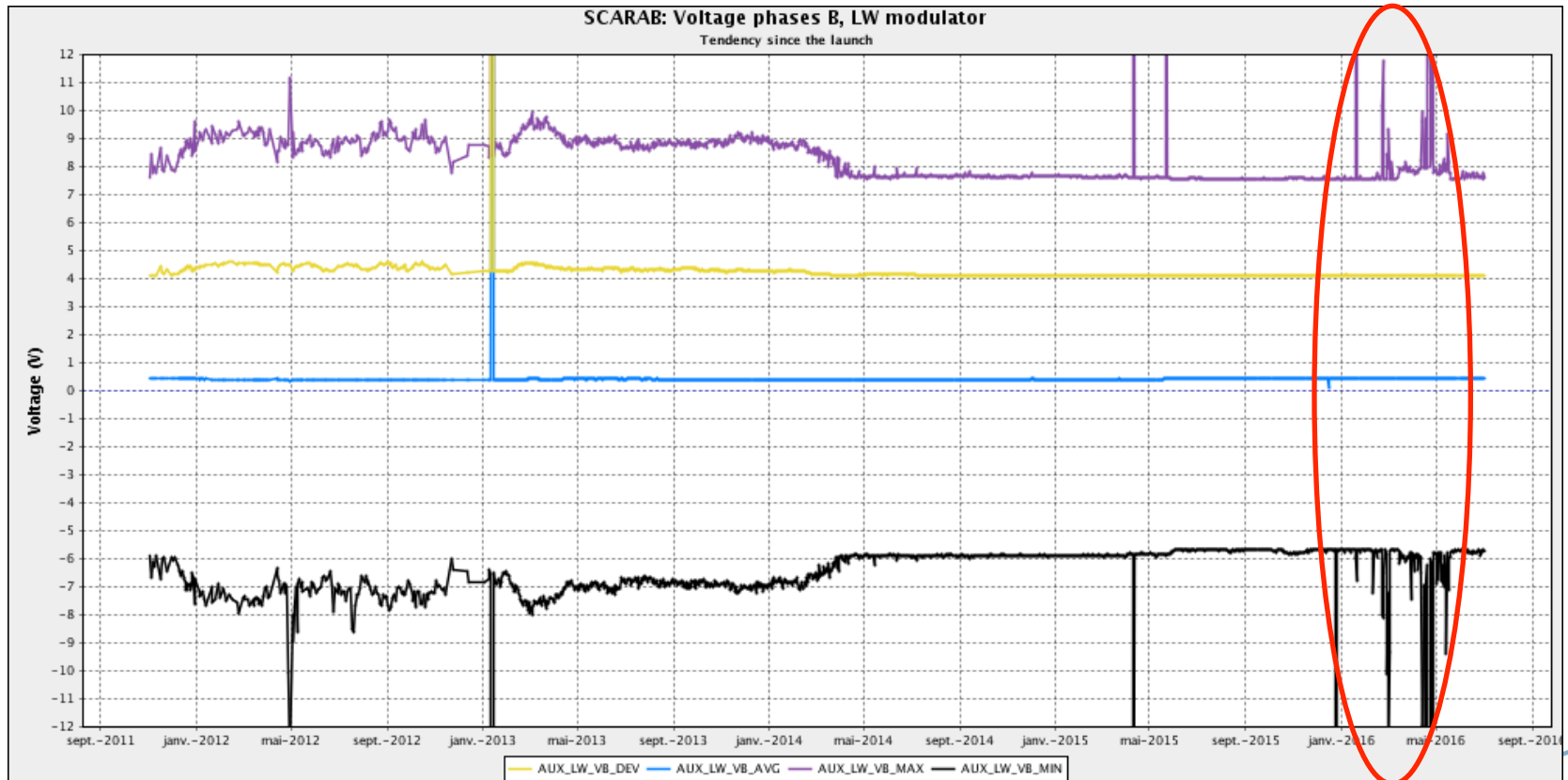


ScaRab : Monitoring Activities 4/5

Data Monitoring

□ SCARAB : Exemple of instrumental monitoring

Recent warnings on modulator mechanism : surely due to lubricant cluster → situation currently back to normal

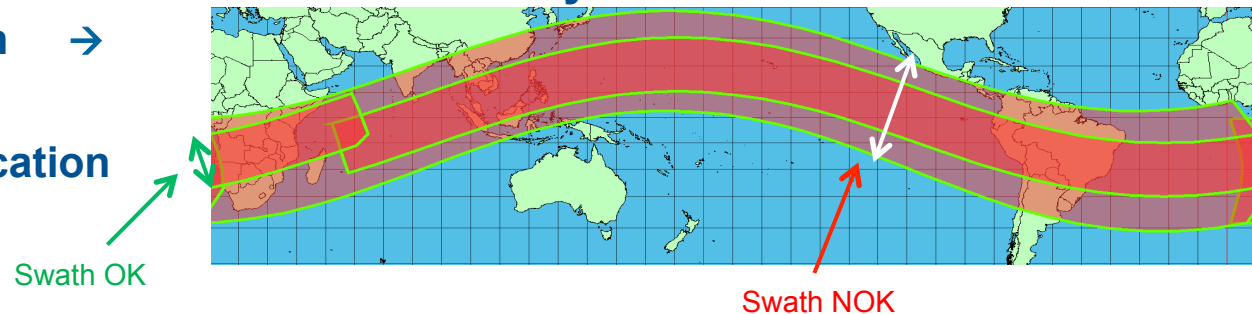


ScaRab : Monitoring Activities 5/5

Data Monitoring

❑ SCARAB : Main new processing in L0 / L1 monitoring

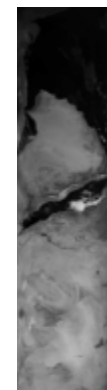
- ✦ SCARAB Automatic Processing of monthly radiometric calibration
- ✦ New Monitoring parameters on L1 Data Quality
 - ✓ Check on swath width →
 - ✓ datation monotony
 - ✓ consistency of geolocation quality flags
 - ✓ Orbit size...
- ✦ Global Monitoring improvment



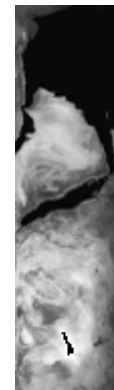
❑ SCARAB : evolutions to come

- ✦ Automatic geometric performances monitoring →
- ✦ Monitoring of invalid geolocations percentage
- ✦ New radiometric monitoring parameter : A' MS-FL
 - ✓ to replace A' MS-TOT currently monitored

ScaRab
extract



VGT
resampled
on ScaRab



Geometric perf.

Level1 Product Archive Completeness and Quality

Product Archive

□ Archive products in CNES premises

● Analysis Criterion : *Completeness*

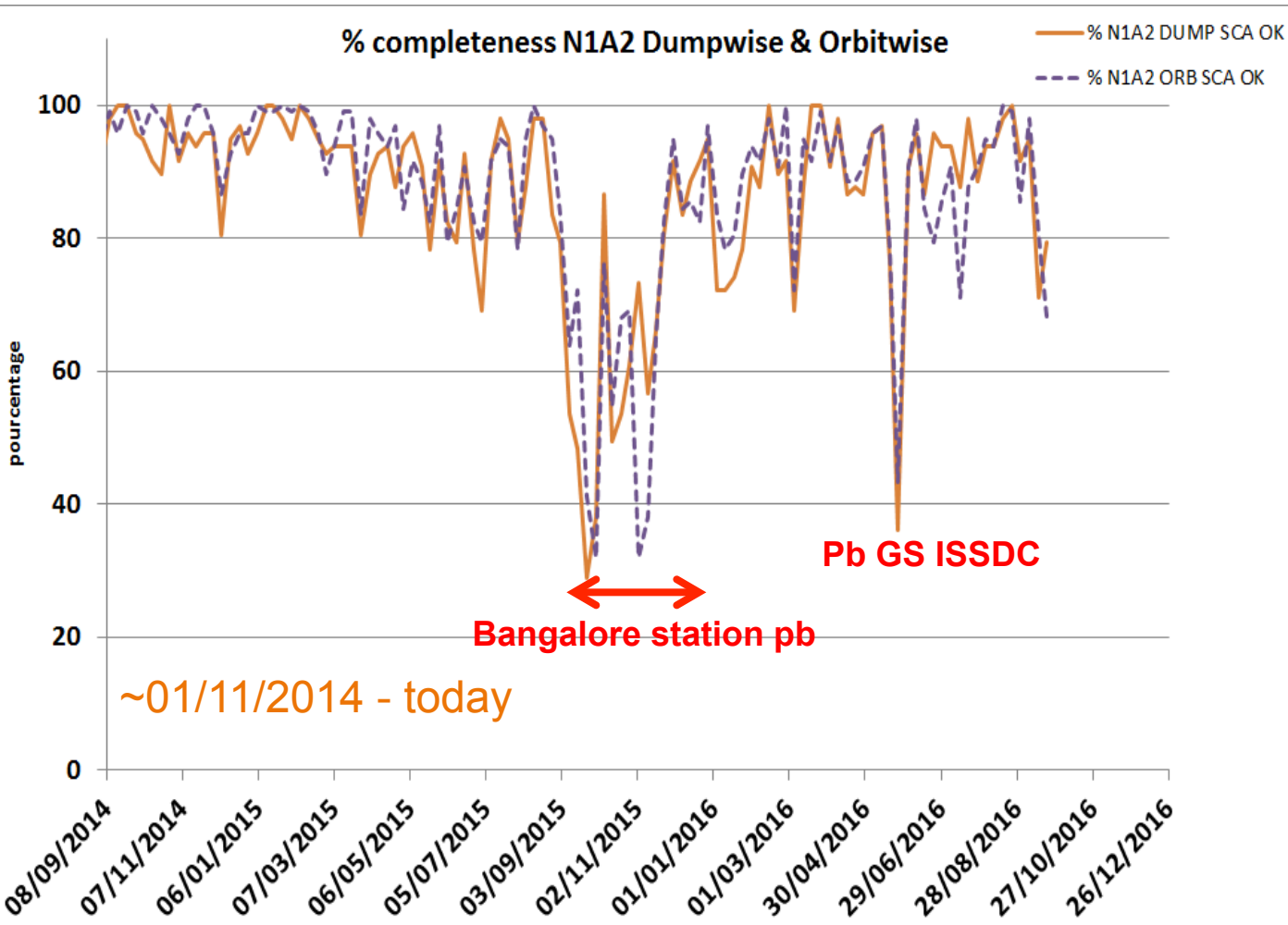
- ◆ theoretical comparison with the number of orbits expected

● Analysis Criterion : *Quality*

- ◆ Average % of invalid radiances on all channels
- ◆ Only based on **radiance quality flag values**
- ◆ Estimated on all products available
- ◆ Specific value per level (L1A,L1A2) and type (Dumpwise, Orbitwise)

Level1 Product Archive Completeness

Product Archive



% Completeness

Nov. 1th 2014 → Sep. 1th 2016

Average % data vs theory

L0 Dumpwise :

89%

L1A2 Dumpwise :

86%

L1A2 Orbitwise :

87%

Level1 Product Archive Quality

Product Archive

% Invalid radiances

Nov. 1th 2014 → Sep. 1th 2016

Average % invalid rad.

L1 Dumpwise : 1,53 %

- Nominal result

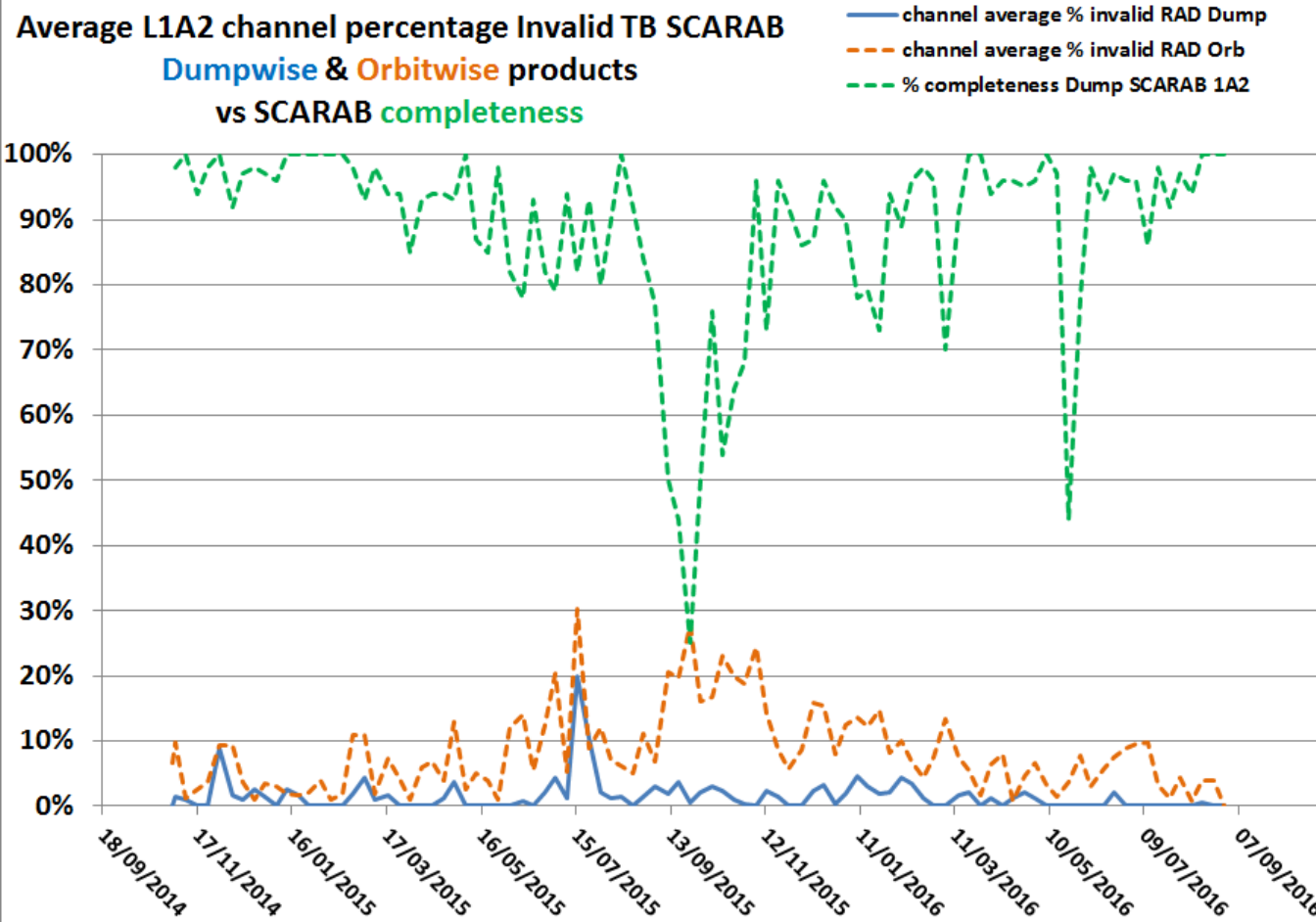
L1 Orbitwise : 8,22 %

- % bigger vs dump.

- In investigation ,
not necessary an
anomaly

- Overestimation suspected
because of difference of
management between
Dumpwises and Orbitwise

→ if no Dump
generation of invalid data
in Orbitwise



Data Access : ICARE server

Data Access

How to download products ?

www.icare.univ-lille1.fr

ICARE Data and Services Center
Cloud-Aerosol-Water-Radiation Interactions

ICARE is part of the *Atmospheric Infrastructure for Atmosphere*

Data Access | Projects | Services | About us | News

ICARE

The ICARE Thematic Center was created in 2003 by CNES, CNRS, the Nord-Pas-De-Calais Regional Council, and the University of Lille, to provide various services to support the research community in fields related to atmospheric research, such as aerosols, clouds, radiation, water cycle, and their interactions. ICARE's initial emphasis is the production and distribution of remote sensing data derived from Earth observation missions from CNES, NASA, and EUMETSAT. One of ICARE's main components is the Data and Services Center, located at the University of Lille, which develops science algorithms and production codes, building on the expertise from various partner Science Computing Facilities, and distributes products to the users community.

HIGHLIGHTS

1st announcement
3rd International A-Train Symposium
19-21 April 2017, Pasadena, California

For over a decade, the A-Train Constellation has successfully collected a uniquely comprehensive environmental data set. The 3rd International A-Train Symposium will be an opportunity to learn and exchange information about A-Train scientific breakthroughs and to highlight how Earth science has benefited from the long, continuous, multi-sensor data set. The 3rd Symposium follows on previous A-Train Symposia held in Lille, France in 2007 and in New Orleans in 2010. To see the official first circular, click [here](#).

Additional information regarding the meeting, as well as on-line registration and abstract submission form, will be available at the following web site: https://espo.nasa.gov/a-train_2017. Another notice will be sent when registration and abstract submission are open.

See the official first circular

Data Access/
Data Archive
+ login

Scarab

rchre | Voyages | Cnes | Megha-Tropiques | SWOT | SWOT Applications | Space Info | Lien | Médias | Colloques | Google | Bing

| File | Description | Size | Last Modified |
|--------------------------------|-------------|------|-------------------|
| HSB/ | | | Oct 29 2009 17:49 |
| ICARE/Restricted access | | | Jun 14 2016 14:02 |
| IIR/ | | | Jul 06 2016 19:41 |
| IIR_MODIS_SEVIRI/ | | | Jan 21 2016 11:28 |
| MADRAS/ | | | Nov 25 2015 10:54 |
| MERIS/ | | | Jul 31 2012 17:25 |
| METEOSAT/ | | | Dec 09 2011 10:05 |
| METEOSAT7/Restricted access | | | Jun 22 2015 14:24 |
| MISR/ | | | Jul 16 2013 17:39 |
| MODIS/ | | | Feb 11 2016 15:34 |
| MODIS_POLDER/Restricted access | | | Jul 07 2010 17:28 |
| MTSAT/Restricted access | | | Apr 15 2011 15:02 |
| MULTI_SENSOR/ | | | Jan 21 2016 11:28 |
| NCEP/ | | | May 28 2015 20:37 |
| OMI/ | | | May 01 2009 01:56 |
| PARASOL/ | | | Sep 29 2016 10:01 |
| POLDER1/ | | | Sep 28 2016 10:04 |
| POLDER2/ | | | Sep 28 2016 09:43 |
| SCARAB/ | | | Aug 30 2016 11:59 |
| SEVIRI/ | | | Mar 09 2016 12:24 |
| SSM/ | | | Apr 21 2015 12:41 |
| SSMIS/ | | | Apr 18 2015 10:29 |
| TMI/ | | | Nov 04 2015 17:07 |
| TOMS/ | | | Jul 16 2008 09:28 |
| VII/Restricted access | | | Sep 29 2016 15:59 |
| VIIRS/ | | | Dec 18 2015 11:26 |
| WFC/ | | | Oct 14 2013 12:12 |

Data may also be accessed through the plain FTP interface at <ftp://ftp.icare.univ-lille1.fr>

ICARE On-line Data Archive

DATA > SCARAB > MT1SCASL1A2.v1.07.8000

| File | Description | Size | Last Modified |
|-------|-------------|------|-------------------|
| .. | | | |
| 2014/ | | | Sep 02 2016 09:12 |
| 2015/ | | | Feb 01 2016 16:52 |
| 2016/ | | | Sep 29 2016 09:06 |

Data may also be accessed through the plain FTP interface at <ftp://ftp.icare.univ-lille1.fr>

Navigation and downloading

Data Access : ICARE server

Data Access

How to browse products

www.icare.univ-lille1.fr

ICARE Data and Services Center
Cloud-Aerosol-Water-Radiation Interactions

ICARE is part of the AERIS Data infrastructure for Atmosphere.

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Browse Images Data Archive Distribution Catalogue User Registration Search and Order

Megha-Tropiques

1st announcement
3rd International A-Train Symposium
19-21 April 2017, Pasadena, California

Data Access/
Browse
Images
+ login

L2 flux

Sign in

ICARE Megha-Tropiques Browse Interface

2016-08-28 Date 20 Min 120 Max Apply range Color LUT rainbow1

Apply Date Selection

Product Selection

Megha-Tropiques

File: MT1_L2-FLUX-SCASLI2-1.07_2016-08-28T01-04-53_V2-00.hdf

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Wm2/sr

Data Access : ICARE server

Data Access

Contacts



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Remark :

- LINUX users
- Possible access to package of files to download :
- Specific shell to execute

Conclusion

☐ Scarab in Megha-Tropiques expertise center

- « Living » Monitoring

- ➔ Automatic monitoring analysed by experts

- ➔ On going activities on monitoring parameters (evolutions to come)

- Instrument Status and Level1 Average data quality OK

| Level1 (radiances) type | Completeness vs theory <i>since 01/11/2014</i> | Quality % invalid radiances <i>since 01/11/2014</i> |
|----------------------------|--|---|
| L1A2 DUMPWISE | 86% | 1,53% |
| L1A2 ORBITWISE | 87% | 8,22% (*) |

(*) over-estimation suspected, not necessary an anomaly

Questions ?

La coopération spatiale entre l'Inde et la France remonte à 50 ans. En 1964, la France transmettait à l'Inde des licences de fusées Centaure, à l'origine des lanceurs spatiaux indiens. Cette coopération est la plus ancienne et importante conduite par l'Inde avec un pays européen. Aujourd'hui, l'agence spatiale indienne (ISRO) constitue le deuxième partenaire du Centre national d'études spatiales (CNES). La coopération privilégie l'étude du climat et la surveillance de l'environnement. Elle s'illustre par deux missions développées et exploitées conjointement : un satellite d'observation de l'atmosphère tropicale, Megha-Tropiques, lancé en 2011, et un d'océanographie et de localisation, Saral-AltiKa, lancé en 2013. Ces missions visent à observer les phénomènes climatiques afin de comprendre leurs mécanismes et d'anticiper leurs conséquences au niveau de la planète (réchauffement, cyclones, moussons, inondations ou sécheresses). Ces succès illustrent la réussite de cette coopération et ouvrent la voie à de nouvelles missions communes.

भारत एवं फ्रांस के मध्य अंतरिक्ष अनुसंधान के क्षेत्र में सहयोग के 50 वर्ष पूर्ण हो चुके हैं। सन् 1964 में फ्रांस ने भारत को सेन्टॉर रॉकेटों के लाइसेंस प्रदान किए थे जिन पर भारतीय प्रक्षेपण यंत्र आधारित हैं। यह भारत और किसी भी यूरोपीय देश के मध्य सबसे विस्तृत एवं पुराना चल रहा सहयोग संबंध है। आज, भारतीय अंतरिक्ष अनुसंधान संगठन (इसरो), फ्रांसीसी अंतरिक्ष अनुसंधान एजेंसी (सीएनईएस) का दूसरा सबसे बड़ा साझेदार है। यह सहयोग मुख्य रूप से जलवायु अध्ययन एवं पर्यावरण प्रबंधन पर केन्द्रित है। इसका सर्वश्रेष्ठ उदाहरण दोनों देशों द्वारा साझा रूप से विकसित तथा प्रवाहित दो मिशन हैं, जिनमें वर्ष 2011 में प्रक्षेपित वातावरण प्रेक्षण उपग्रह मेघाट्रोपिक और 2013 में प्रक्षेपित समुद्र विज्ञान और स्थानियकरण उपग्रह, सरल-एल्टिका शामिल हैं। इस मिशनों का उद्देश्य जलवायु संबंधी घटनाओं का प्रेक्षण करना है, ताकि इनकी प्रक्रियाओं को समझते हुए वैश्विक स्तर पर इनके परिणामों (ग्लोबल वार्मिंग, चक्रवात, मानसून, बाढ़ और सूखा) का पूर्वानुमान लगाया जा सके। ये उपलब्धियाँ इस सहयोग की सफलता को दर्शाती हैं तथा नए साझा उद्देश्यों के लिए कार्य करने का मार्ग प्रशस्त करती हैं।

India and France have cooperated in space exploration for fifty years. In 1964, France provided India with licenses for the Centaure rockets, on which Indian launchers are based. This is the most extensive and longest running cooperation between India and any European country. Today, the Indian space agency (ISRO) is the second biggest partner of the French space agency (CNES-Centre national d'études spatiales). The cooperation is mostly focussed on studying the climate and environmental monitoring. It is best illustrated by two missions that were developed and operated in partnership: a tropical atmosphere observation satellite, Megha-Tropiques, launched in 2011, and Saral-AltiKa, an oceanography and localisation satellite, launched in 2013. These missions aim to observe climatic phenomena in order to understand the mechanisms and anticipate their consequences on a planetary level (global warming, cyclones, monsoons, flooding and droughts). These achievements illustrate the success of this cooperation and open the way to new common missions.

Collection Historique du Timbre-Poste Français



CNES-ISRO
stamp for
50years of
cooperation